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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,009	01/20/2004	Joong S. Jeon	0180154	3709

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EXAMINER	
PHAM, LONG	
ART UNIT	**PAPER NUMBER**
2814	

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/761,009	JEON ET AL.	
	Examiner	Art Unit	
	Long Pham	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-14 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-14 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1, 2, and 6 are rejected under 35 U.S.C. 102(a) as being anticipated by En et al. (US patent 6,563,183).

With respect to claim 1, En et al. teach a method of forming a field-effect transistor on a substrate said method comprising step of (see associated text in cols. 5-7):

forming a buffer layer on a substrate, said buffer layer comprising a ALD silicon dioxide; and

forming a high-k dielectric layer over said buffer layer.

With respect to claims 2 and 6, En et al. further teach forming a gate electrode of polysilicon over said high-k dielectric layer.

3. Claims 8, 9, and 13 are rejected under 35 U.S.C. 102(a) as being anticipated by En et al. (US patent 6,563,183).

En et al. teach a method for forming a field effect transistor on a substrate said method comprising a step of forming a buffer layer on said substrate, said method being characterized by:

forming a high-k dielectric layer on said buffer layer, wherein said buffer layer comprises ALD silicon dioxide.

With respect to claims 9 and 13, En et al. further teach forming a gate electrode of polysilicon over said high-k dielectric layer.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 3, 4, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over En et al. (US patent 6,563,183) as applied to claims 1, 2, and 6 above, and further in view of Kim (US publication 2005/0048765).

With respect to claim 3, En et al. fail to teach that the silicon dioxide ALD layer is formed using $SiCl_4$ precursor.

Kim teaches forming a Silicon dioxide ALD using $SiCl_4$ precursor. See [0042].

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to incorporate Kim's teaching into the process of Un et al. because the use of ALD allows the formation of silicon dioxide.

With respect to claim 4, Since En et al. in view of Kim teaches claimed process of forming claimed buffer layer, the formed buffer layer would inherently comprise substantially no pin-hole defects.

With respect to claim 5, En et al. further teach the buffer layer having a thickness of 5.0 to 7.0 Angstroms but fail to teach claimed range of 5.0 Angstroms or less.

However, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art

would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

With respect to claim 7, the use of hafnium oxide as high-k dielectric is well-known in the art.

3. Claims 10, 11, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over En et al. (US patent 6,563,183) as applied to claims 8, 9 and 13 above, and further in view of Kim (US publication 2005/0048765).

With respect to claim 10, En et al. fail to teach that the silicon dioxide ALD layer is formed using $SiCl_4$ precursor.

Kim teaches forming a Silicon dioxide ALD using $SiCl_4$ precursor. See [0042].

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to incorporate Kim's teaching into the process of Un et al. because the use of ALD allows the formation of silicon dioxide.

With respect to claim 11, Since En et al. in view of Kim teaches claimed process of forming claimed buffer layer, the formed buffer layer would inherently comprise substantially no pin-hole defects.

With respect to claim 12, En et al. further teach the buffer layer having a thickness of 5.0 to 7.0 Angstroms but fail to teach claimed range of 5.0 Angstroms or less.

However, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

With respect to claim 14, the use of hafnium oxide as high-k dielectric is well-known in the art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long Pham whose telephone number is 571-272-1714. The examiner can normally be reached on M-F, 7:30AM-3:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Pham
Primary Examiner
Art Unit 2814

LP

1.